

Critical Thinking

- 1-23 Suppose that 1000 electrons are removed from a neutral dielectric. How much charge, in coulombs, is stored in the dielectric?
- 1-24 How long will it take an insulator that has a charge of +5 C to charge to +30 C if the charging current is 2 A?

- 1-25 Assume that 6.25×10^{15} electrons flow past a given point in a conductor every 10 s. Calculate the current / in amperes.
- 1-26 The conductance of a wire at 100°C is one-tenth its value at 25°C . If the wire resistance equals $10\ \Omega$ at 25°C , calculate the resistance of the wire at 100°C .

- 1-27 Calculate the conductance value in siemens for each of the following resistance values: (a) $1\ \Omega$ (b) $10\ \text{k}\ \Omega$ (c) $40\ \Omega$ (d) $0.5\ \Omega$.
- 1-28 Calculate the conductance value in siemens for each of the following resistance values: (a) $200\ \Omega$ (b) $100\ \Omega$ (c) $50\ \Omega$ (d) $25\ \Omega$.
- 1-29 Calculate the resistance value in ohms for the following conductance values: (a) $0.002\ \text{S}$ (b) $0.004\ \text{S}$ (c) $0.00833\ \text{S}$ (d) $0.25\ \text{S}$.
- 1-30 Calculate the resistance value in ohms for the following conductance values: (a) $0.001\ \text{S}$ (b) $0.01\ \text{S}$ (c) $0.1\ \text{S}$ (d) $1\ \text{S}$.

SECTION 1-7 RESISTANCE IS OPPOSITION TO CURRENT

- 1-31 If a current of 1.5 A charges a dielectric for 5 s, how much charge is stored in the dielectric?
- 1-32 If a current of 500 mA charges a dielectric for 2 s, how much charge is stored in the dielectric?
- 1-33 If a current of $200\ \mu\text{A}$ charges a dielectric for 20 s, how much charge is stored in the dielectric?
- 1-34 A charge of 0.1 C moves past a given point every 0.01 s. How much is the current?
- 1-35 A charge of 0.05 C moves past a given point every 0.1 s. How much is the current?
- 1-36 A charge of 6 C moves past a given point every 0.3 s. How much is the current?
- 1-37 A charge of 0.05 C moves past a given point every 0.1 s. How much is the current?
- 1-38 A charge of 1 C moves past a given point every 0.1 s. How much is the current?
- 1-39 A charge of 2 C moves past a given point every 0.5 s. How much is the current?

SECTION 1-6 CHARGE IN MOTION IS CURRENT

- 1-40 Write the formulas for each of the following statements: (a) current is the time rate of change of charge (b) charge is current accumulated over a period of time.
- 1-41 Briefly define each of the following: (a) 1 coulomb (b) 1 volt (c) 1 ampere (d) 1 ohm.
- 1-42 Describe the difference between direct and alternating current.
- 1-43 Why is it that protons are not considered a source of moving charges for current flow?

SECTION 1-5 THE VOLT UNIT OF POTENTIAL DIFFERENCE

- 1-44 If 37.5×10^{18} electrons are added to a neutral dielectric, how much charge is stored in coulombs?
- 1-45 A dielectric with a positive charge of +5 C has 18.75×10^{18} electrons added to it. What is the net charge of the dielectric in coulombs?
- 1-46 If 93.75×10^{18} electrons are removed from a neutral dielectric, how much charge is stored in coulombs?
- 1-47 What is the output voltage of a battery if 10 J of energy is expended in moving 1.25 C of charge?
- 1-48 What is the output voltage of a battery if 6 J of energy is expended in moving 1 C of charge?
- 1-49 What is the output voltage of a battery if 12 J of energy is expended in moving 1 C of charge?
- 1-50 How much is the potential difference between two points if 0.5 J of energy is required to move 0.4 C of charge between the two points?
- 1-51 How much energy is expended, in joules, if a voltage of 12 V moves 1.25 C of charge between two points?

SECTION 1-4 THE COULOMB UNIT OF ELECTRIC CHARGE

Problems

- 1-1 If 31.25×10^{18} electrons are removed from a neutral dielectric, how much charge is stored in coulombs?
- 1-2 If 18.75×10^{18} electrons are added to a neutral dielectric, how much charge is stored in coulombs?
- 1-3 A dielectric with a positive charge of +5 C has 18.75×10^{18} electrons added to it. What is the net charge of the dielectric in coulombs?
- 1-4 If 93.75×10^{18} electrons are removed from a neutral dielectric, how much charge is stored in coulombs?
- 1-5 If 37.5×10^{18} electrons are added to a neutral dielectric, how much charge is stored in coulombs?
- 1-6 What is another name for an insulator?
- 1-7 List the particles in the nucleus of an atom.
- 1-8 Explain the difference between electron flow and conventional current.
- 1-9 Define -3 C of charge and compare it to a charge of +3 C.
- 1-10 Why is it that protons are not considered a source of moving charges for current flow?